REMARKS

Claims 1-57 are pending. By this Amendment, claims 13, 14, 16, 17, 24, 27, and 50 are canceled, while claims 1, 11, 12, 18, 19, 23, 44, 48, 49, 51, 52, and 54 are amended.

I. Claim Objections

Claims 17 and 18 stand rejected due to incorrect dependency. Applicant respectfully submits that the claim dependency is correct in that claims 17 and 18 provide additional limitations to the manner of establishing priority, claim 17 providing an additional limitation to claim 16, and claim 18 providing an additional limitation to claim 17. The methods noted within the claims are not independent but are used in conjunction with the earlier limitations. As such, Applicant respectfully requests that the objection to claim 18 be withdrawn (the limitation of claim 17 has been moved into independent claim 12), and that it be considered for patentability as it stands.

Applicant duly notes the objection to claims 19 and 31-33 due to dependency on a rejected claim. As evidenced by arguments below, Applicant respectfully submits that all claims are now in an allowable condition and, therefore, requests that the objection to claims 19 and 31-33 be withdrawn.

II. Claim Rejections 35 USC §112

Claims 11, 44, and 50 stand rejected under 35 USC §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 11 and 44 provide the limitation that the digital channels define a machine as a "complete machine or a virtual machine" in claim 11, or "a machine or virtual machine" in claim 44. Claim 50 recites "said plurality of machines comprise a plurality of virtual machines".

Claims 11 and 44 have been amended but still contain the limitation of a "virtual machine." The concept of a "virtual machine" is described in detail starting at page 20, line 13 through page 21, line 10, and is described as the ability to select a subset of digital channels from the complete set of channels that define a complete machine and/or are controlled by the CMC. Claim 50 has been cancelled.

III. Claim Rejections 35 USC §102 and §103

Claims 1-18, 20-30, and 34-57 stand rejected under either 35 USC §102 as being anticipated by Williams (U.S. Patent No. 5,754,451) or 35 USC §103 as being obvious in view of Williams in combination with other noted references.

Independent claim 1 and independent claim 48 have been amended to recite that the digital channels used have been pre-defined to comprise a virtual machine. The "virtual machine" is a subset of digital channels from the complete set of digital channels that the CMC is controlling. (See page 20, line 13 through page 21, line 10). As indicated within the specification, this is a unique and useful characteristic of the present invention and is especially important in a controlled process that involves numerous operational stations and/or transfers between stations that are all controlled by a single CMC. In such a situation, each operational station and/or each transfer may be identified as a virtual machine within the system allowing the user to monitor each operational station and each transfer separately. The ability to monitor each operational station and each transfer separately allows the user to determine more accurately which operational station or transfer has caused the first problem in a shutdown. The fewer inputs/outputs to monitor, the more quickly and more efficiently the cause of a problem can be ascertained.

Williams does not disclose, teach or suggest the concept of a virtual machine, i.e., it does not disclose, teach or suggest the ability to monitor a subset of inputs/outputs, rather all inputs/outputs are included within and monitored by the system of Williams, requiring that all inputs/outputs be reviewed and addressed for the cause of a problem. As such, Applicant

respectfully requests that the rejection to claim 1, and those claims depending therefrom, be withdrawn. Likewise, Applicant respectfully requests that the rejection to claim 48, and those claims depending therefrom, be withdrawn.

Independent claim 12 has been amended to include the limitation of claims 16 and 17 such that it describes the analysis being performed to determine a downtime event as at least a two-step analysis that includes a probability percentage analysis and a time sequence analysis. (See supporting description with the specification at page 35, line 16 through page 36, line 20). Williams utilizes *only* a probability percentage. However, the use of only a probability percentage limits the accuracy of the determination of the downtime event. For example, in systems wherein inputs/outputs are being sampled by another controller, the sample rate can have a great affect upon which fault/deviation is picked up first. The first fault picked up through the sampling may not necessarily be the cause of the downtime but rather may be a fault that has occurred quite a bit of time after the cause of the downtime. In order to know which fault is more likely the actual cause of the downtime, one must also look at the operational sequence to determine which fault occurred first in the expected sequence of operation. Only the present invention performs this function. As such, Applicant requests that the rejection to claim 12, and to those claims depending therefrom, be withdrawn.

Independent claim 23 has been amended to include the limitations of claims 24 and 27 (statistically significant deviation) and has also been amended to more clearly define the invention whereby the claim recites that the experienced event, i.e., the unexpected transition or lack of an expected transition, is measured from a "pre-defined cycle start." Claims 24 and 27 were rejected under 35 USC §103 as being unpatentable over Williams in view of Elsley (U.S. Patent No. 5,949,676). The invention described in Elsley does not measure all of its timing patterns from a pre-defined start point but rather analyzes all possible relationships between I/O in an attempt to develop timing patterns between them, see col. 5, lines 43-58. The result of Elsley is a very complicated rules system that constantly revises itself and provides no true reference data point, e.g., a pre-defined cycle start, from which to provide consistent and reliable

transition time measures as does the presently claimed invention (see the specification at page 30, line 19 through page 31, line 6, and specification page 19, lines 6-8). As such, Applicant respectfully requests that the rejection of claim 23, and those claims depending therefrom, be withdrawn.

Independent claim 29 stands rejected under 35 USC §103(a) as being unpatentable over Williams in view of U.S. Patent No. 4,396,974 to Imazeki. As the Office Action indicates, Williams does not disclose the display of sequence diagrams of both historical and current transition data. Rather, the Office Action relies upon Imazeki for the teaching of a sequence diagram. Applicant respectfully traverses this rejection. The sequence diagram of Imazeki does not display current or historical transitional data, rather the sequence diagram is actually a ladder logic diagram that controls the operation of the system (see description of the drawings wherein the diagrams are described as "ladder diagrams"). Imazeki does not teach or suggest the possibility of displaying transitional data in a sequence diagram and is therefore not appropriately combined with Williams. As such, Applicant respectfully requests that the rejection of independent claim 29 under 35 USC §103(a), and of all claims depending therefrom, be withdrawn.

Independent claim 40 stands rejected under 35 USC §103(a) as being unpatentable over Williams in view of Imazeki, and further in view of U.S. Patent No. 5,586,156 to Gaubatz. Applicant respectfully traverses the rejection. First, Applicant respectfully disagrees with the Office Action's interpretation of Imazeki, however, for argument's sake it is presumed that the interpretation of Imazeki is correct (see argument with respect to Imazeki immediately above in relation to claim 29). The argument in this instance is then left to focus on Gaubatz. The invention of Gaubatz is a monitoring system for the shutdown of nuclear reactors. It utilizes a redundant monitoring system to move between three modes of operation, i.e., shutdown/maintenance, startup/operate, and scram (emergency shutdown), see col. 5, lines 45-50. It utilizes parameters that are continuously sensed throughout all modes of operation, i.e., a sensor does not quit working because the system has gone to another operational mode, see col.

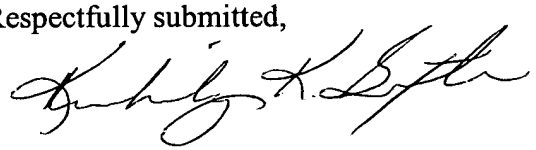
8, lines 54-57, col. 9, lines 27-29, and col. 10, lines 34-51 (continuous monitoring). The change between modes of operation is only in the operator inputs that are allowed to the system, see col. 5, lines 51-53. Gaubatz does not define sub-sets of data but rather continuously monitors for deviations outside of pre-established values rather than deviations from past operations, i.e., historical data, see col. 10, lines 39-43. Since Gaubatz does not teach or suggest the claimed limitation of establishing "an expected historical pattern of said sub-set transition data that is comparable to a current corresponding sub-set of transition data" claim 40 has not been obviated by the cited references and Applicant respectfully requests that the rejection of claim 40 be withdrawn.

Independent claim 48 is addressed above in accordance with the arguments presented relative to independent claim 1.

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,



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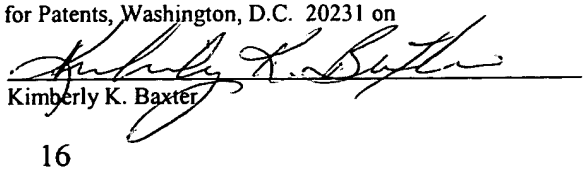

Kimberly K. Baxter

ATTACHMENT
REDLINED AMENDMENT

In the Claims

Please cancel claims 13, 14, 16, 17, 24, 27, and 50 without prejudice or disclaimer.

Please substitute the following amended claims for those currently pending:

1. (Once Amended) A computerized machine control (CMC) monitoring system, wherein said CMC utilizes a control program to control the operation of a machine through the use of a plurality of digital channels wherein said plurality of digital channels have been pre-defined to comprise a virtual machine , said system comprising:

a data acquisition component, wherein said data acquisition component is in communication with said CMC, and wherein said data acquisition component acquires transition data about said plurality of digital channels; and

a data storage component, wherein said data storage component is in communication with said data acquisition component, wherein said data storage component stores the acquired transition data to establish an historical pattern of transition data that is comparable to current transition data independent of the control program, and wherein upon comparison of said current transition data to said historical pattern of transition data a determination of the operational status of said virtual machine can be made.

11. (Once Amended) The system of claim 1, wherein said plurality of digital channels [define a machine selected from a group consisting of: a substantially complete machine and a virtual machine] wherein said plurality of digital channels have been pre-defined to comprise a plurality of virtual machines.

12. (Once Amended) A computerized machine control (CMC) analysis system, wherein said CMC utilizes a control program to control the operation of a machine through the use of a plurality of digital channels, said system comprising:

a data acquisition component, wherein said data acquisition component is in communication with said CMC, and wherein said data acquisition component acquires transition data about said plurality of digital channels; and

an analysis component, wherein said analysis component is in communication with said data acquisition component, wherein said analysis component performs analysis on the acquired transition data to determine if the machine has experienced a downtime event, and wherein said analysis component develops an inventory of which of said plurality of digital channels likely caused said downtime event independent of said control program, wherein the performed analysis is at least a two-step analysis including a probability percentage analysis and a time sequence analysis.

13. (Canceled) The system of claim 12, wherein the performed analysis comprises statistical analysis.

14. (Canceled) The system of claim 13, wherein said statistical analysis is standard deviation analysis.

16. (Canceled) The system of claim 15, wherein said priority is established according to a calculated probability percentage.

17. (Canceled) The system of claim 16, wherein said priority is established according to a time sequence of said acquired transition data.

18. (Once Amended) The system of claim [17] 12, wherein said priority is established according to a time proximity to the occurrence of said downtime event.

19. (Once Amended) The system of claim [16] 12, wherein the calculation of said probability percentage is determined from a pre-selected historical reference data set.

23. (Once Amended) A computerized machine control (CMC) analysis system, wherein said CMC utilizes a control program to control the operation of a machine through the use of a plurality of digital channels, said system comprising:

a data acquisition component, wherein said data acquisition component is in communication with said CMC, and wherein said data acquisition component acquires transition data about said plurality of digital channels; and

an analysis component, wherein said analysis component is in communication with said data acquisition component, wherein said analysis component performs statistical analysis on the acquired transition data to determine if one of said plurality of digital channels has experienced an event, as measured from a pre-defined cycle start, selected from a group consisting of: an unexpected transition absent a downtime event and a lack of an expected transition absent a downtime event, wherein said unexpected transition and said lack of said expected transition are characterized by a statistically significant deviation and wherein said analysis component makes the determination independent of said control program.

24. (Canceled) The system of claim 23, wherein the performed analysis comprises statistical analysis.

27. (Canceled) The system of claim 24, wherein said unexpected transition is characterized by a statistically significant deviation.

44. (Once Amended) The system of claim 42, wherein said pre-selected reference data set comprises said plurality of digital channels which have been previously selected to define a [machine or] virtual machine.

48. (Once Amended) A computerized machine control (CMC) monitoring system, wherein said CMC utilizes a control program to control the operation of a machine through the use of a plurality of digital channels wherein said plurality of digital channels have been pre-defined to comprise a virtual machine, said system comprising:

a data acquisition component, wherein said data acquisition component is in communication with said CMC, and wherein said data acquisition component acquires transition data about said plurality of digital channels;

a data storage component, wherein said data storage component is in communication with said data acquisition component, wherein said data storage component stores the acquired transition data to establish an historical pattern of transition data that is comparable to current transition data independent of the control program, and wherein upon comparison of said current transition data to said historical pattern of transition data a determination of the operational status of said virtual machine can be made; and

a viewing component, wherein said viewing component is in communication with said data storage component, and wherein said viewing component displays the operational status of said virtual machine.

49. (Once Amended) The system of claim 48, wherein said virtual machine comprise a plurality of virtual machines, and said viewing component displays the operational status of said plurality of virtual machines substantially simultaneously.

50. (Cancel) The system of claim 49, wherein said plurality of machines comprise a plurality of virtual machines.

51. (Once Amended) The system of claim 49, wherein said plurality of virtual machines performs different functions.

52. (Once Amended) The system of claim 48, wherein the operational status of said virtual machine is displayed in the form of a stack-light.

54. (Once Amended) The system of claim 49, wherein at least one of said plurality of virtual machines utilizes a communication scheme distinct from another of said plurality of virtual machines.